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[54]发明名称 一种乙烯利和吡虫啉二元复配植物生长调节杀虫剂

[57]摘要

一种被植物吸收后能调整株型、提高光合作用、增加雌花、减少顶端优势、增加有效分蘖、使植株矮壮、防倒、防空秆、防秃尖、提高结实率、促早熟和防治吮吸式口器害虫及鞘翅目、双翅目和鳞翅目的乙烯利(ethephon)和吡虫啉(imidacloprid)的二元复配植物生长调节杀虫水剂由1—50%的乙烯利、0.5%—10%的吡虫啉、2—10%的乳化分散剂、1—10%的助溶剂、10—40%的硫酸或盐酸和水组成。具有天然、高效、低毒、增产、使用方便、安全等优点,可广泛使用于玉米、小麦、水稻、果树、棉花和瓜类作物,在农业上将有广泛的应用。

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Chinese Patent

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**A Kind of Vegetation Regulator Pesticide Synthesized with Ethephon  
and Imidacloprid**

[一种乙烯利和吡虫啉二元复配植物生长调节杀虫剂]

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UNITED STATES PATENT AND TRADEMARK OFFICE

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剂  
English Title : A Kind of Vegetation Regulator  
Pesticide Synthesized with Ethephon  
and Imidacloprid

## Claims

1. A kind of vegetation regulator pesticide synthesized with ethephon and imidacloprid composed of the active ingredients, emulsification dispersant, cosolvent, acid and water. When absorbed by plants, it is able to regulate truck shapes, promote photosynthesis, increase female flowers, reduce apical dominance, enhance effective segregation, strengthen stalk y, prevent from lodging, hollowness or baldness, raise yield, promote precocity and disinfect insects in categories of suck-mouth, coleopterous, dipsters or lepidopter. The pesticide is characterized by:
  - (a) the weight concentration of ethephon is 1~50%;
  - (b) the weight concentration of imidacloprid is 0.5~10%;
  - (c) the weight concentration of emulsification dispersant is 2~10%;
  - (d) the weight concentration of cosolvent is 1~100%;
  - (e) the weight concentration of sulphuric acid or hydrochloric acid is 1~100%;and the rest is water.
2. A preparation of the vegetation regulator pesticide synthesized with ethephon and imidacloprid described in Claim 1. When absorbed by plants, it is able to regulate truck shapes, promote photosynthesis, increase female flowers, reduce apical dominance, enhance effective segregation, strengthen stalk y, prevent from lodging, hollowness

or baldness, raise yield, promote precocity and disinfest insects in categories of suck-mouth, coleopterous, dipsters or lepidopter.

The pesticide is characterized by the following process. The imidacloprid is dissolved in the acid (heated if necessary) before the ethephon and the cosolvent are added. When they are completely dissolved, the emulsification dispersant is added dropwisely within 15~20 minutes. The temperature is set at 50~60°C. After the water (at 70~80°C) is added, the solution is stirred slowly for 10 minutes.

Cooled down to about 30°C, the pesticide is packed after filtered.

3. A preparation of the vegetation regulator pesticide synthesized with ethephon and imidacloprid described in Claim 1. Its active ingredients include ethephon and imidacloprid or acetamiprid.

4. The emulsification dispersant used in the vegetation regulator pesticide synthesized with ethephon and imidacloprid described in Claim 1 is a monomer or mixed compound of polyoxyethylene ethyl ether, agricultural emulsifier No.600, 1600, dodecylbenzenesulfonic acid, sulfate or phosphate salt of polyoxyethylene ethyl ether, or sulfate or phosphate salt of agricultural emulsifier No.600.

5. The cosolvent used in the vegetation regulator pesticide synthesized with ethephon and imidacloprid described in Claim 1 is a monomer, such as N-methylpyrrolidone, butylcellosolve, or DMF.

6. The acid used in the vegetation regulator pesticide synthesized with ethephon and imidacloprid described in Claim 1 is sulphuric acid or hydrochloric acid.

### Description

#### A Kind of Vegetation Regulator Pesticide Synthesized with Ethephon and Imidacloprid

It is a preparation of the vegetation regulator pesticide synthesized with ethephon and imidacloprid. When absorbed by plants, it is able to regulate truck shapes, promote photosynthesis, increase female flowers, reduce apical dominance, enhance effective segregation, strengthen stalk y, prevent from lodging, hollowness or baldness, raise yield, promote precocity and disinfest insects in categories of suck-mouth, coleopterous, dipsters or lepidopter. It is a kind of unique, 2-in-1, and 21<sup>st</sup> century used pesticide synthesized with active ingredients, emulsification dispersant, cosolvent, acid and water to regulate vegetation (e.g. corn or fruit tree) and disinfest insects (e.g. corn borer).

As a kind of regular vegetation regulator for plants, such as corn or fruit tree, the ethephon solution is usually applied in the maturing period of plants. Corn borer is a kind of lepidopters to harm corns. At present, imidacloprid is the main measure to disinfest corn borers. However, at the later period the corn growth, the high stalks make it is difficult to apply the pesticide on them. Therefore, we found that the solution synthesized with ethephon and imidacloprid has much better disinsection effect with less residual

level. The vegetation regulation and disinsection are done in only one step. The above mentioned problem is settled basically. Now, this invention has been accomplished.

The second purpose of this invention is to provide a kind of production technology to synthesize the solution of ethephon and imidacloprid with the accessory compositions.

To accomplish the above purposes, this invention is completed as follows:

- a) the weight concentration of ethephon is 1~50%;
  - b) the weight concentration of imidacloprid is 0.5~10%;
  - c) the weight concentration of emulsification dispersant is 2~10%;
  - d) the weight concentration of cosolvent is 1~100%;
  - e) the weight concentration of sulphuric acid or hydrochloric acid is 1~100%;
- the rest is water.

The purpose of this invention can also be accomplished in the following procedures:

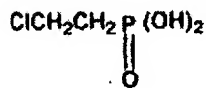
The imidacloprid is dissolved in the acid (heated if necessary) before the ethephon and the cosolvent are added. When they are completely dissolved, the emulsification dispersant is added dropwisely within 15~20 minutes. The temperature is set at 50~60°C. After the water (at 70~80°C) is added, the solution is stirred slowly for 10 minutes.

Cooled down to about 30°C, the pesticide is packed after filtered.

The molecular structures of the active ingredients in this invention are:

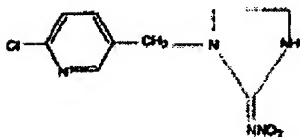
(1) Ethephon

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Triethyl phosphate is synthesized by the reaction of ethylene oxide and phosphorous trichloride. After rearrangement, dimethyl phosphite is prepared. Then, ethephon is synthesized by the reaction of dimethyl phosphite and hydrochloric acid.

(2) Imidacloprid



2-chlorine-5- picoline is synthesized by the reaction of 3-picoline and benzoyl chloride. 2- chlorine-5- chloride picoline is synthesized when chlorine is added. Imidacloprid is synthesized by the reaction of 2- chlorine-5- chloride picoline and N-nitryl-4,5-dihydro-1H-imidazole-2-amine. And the imidazole can be synthesized by the reaction of ethylenediamine and nitroguanidine.



The emulsification dispersant used in this invention is a monomer or mixed compound of agricultural emulsifier No. 100, 600, 1600, their sulfate or phosphate salt, or dodecylbenzenesulfonic acid. The cosolvent used in this invention is N-Methylpyrrolidone, butylcellosolve, or DMF.

The acid used in this invention is sulphuric acid or hydrochloric acid.

The following examples are used to describe this invention further.

Example 1:

22 g of 91% imidacloprid and 300 g of sulphuric acid or hydrochloric acid (160 ml of 98% sulphuric acid) are added into a 1000 ml flask fitted with a thermometer (or thermocouple) and a stirrer. After the above solution is heated up to 50~60°C and completely dissolved, 400 g of ethephon, 50 g of dodecylbenzenesulfonic acid (at 50~60°C), 30 g of DMF and 180 g of water are added. When stirred for 20~40 minutes, cooled down to 28°C and hold for 10 minutes, 1002 g of solution can be prepared after filtering. The sample is packed at last.

Example 2:

33 g of 91% imidacloprid and 350 g of sulphuric acid or hydrochloric acid (186 ml of 98% sulphuric acid) are added into a 1000 ml flask fitted with a thermometer (or thermocouple) and a stirrer. After the above solution is heated up to 50~60°C and completely dissolved,

400 g of ethephon, 56 g of dodecylbenzenesulfonic acid (at 50~60°C), 40 g of DMF and 110 g of water are added. When stirred for 20~40 minutes, cooled down to 28°C and hold for 10 minutes, 996 g of solution can be prepared after filtering. The sample is packed at last.

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#### Example 3:

27.5 g of 91% imidacloprid and 320 g of sulphuric acid or hydrochloric acid (170 ml of 98% sulphuric acid) are added into a 1000 ml flask fitted with a thermometer (or thermocouple) and a stirrer. After the above solution is heated up to 50~60°C and completely dissolved, 400 g of ethephon, 50 g of dodecylbenzenesulfonic acid (at 50~60°C), 36 g of DMF and 160 g of water are added. When stirred for 20~40 minutes, cooled down to 28°C and hold for 10 minutes, 992 g of solution can be prepared after filtering. The sample is packed at last.

The effects of the pesticide in this invention on disinfesting corn borer are shown in Table 1:

Table 1

Treatment	Extension rate	Sampling number	Borer number	Incidence (%)	Prevention effect	Mean effect
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			r		(%)	(%)
Example 1	400	1000	15	1.5	98.5	96.7
	600	1000	38	3.8	96.2	
	1000	1000	45	4.5	95.5	
Example 2	400	1000	12	1.2	98.8	97.4
	600	1000	30	3.0	97.0	
	1000	1000	35	3.5	96.5	
Example 3	400	1000	18	1.8	98.2	97.0
	600	1000	29	2.9	97.1	
	1000	1000	43	4.3	95.7	
40% ethephon solution	600	1000	320	32.0	-	-
2% imidacloprid emulsifiable solution	2000	1000	18	1.8	98.2	98.2

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The effects of the pesticide in this invention on regulating vegetation are shown in Table 2:

Table 2

Treatment	Extension rate	Stalk height cm	Stalk thickness cm	Lodging rate %	Baldness (cm)

Example 1	600	250	5	2	1.2
Example 2	600	248	4.8	1.7	1
Example 3	600	245	5.1	2.1	1.3
40% ethephon watery solution	2500	251	4.7	1.9	1
2% imidacloprid emulsifiable solution	2000	295	4	38	4

The watery solution of vegetation regulator pesticide in this invention has the following advantages over other similar products:

1. Effective; low toxicity, easy application and safe.
2. Both to regulate vegetation and to disinfest the insects in the categories of suck mouth, coleopterous, dipsters and lepidopter into one; and especially effective to disinfest corn borer.
3. A new concept pesticide for the 21<sup>st</sup> century with the unique 2-in-1 functions, i.e. vegetation regulation and disinsection,